

METHOD FOR APPLYING DESIGNS TO A SUBSTRATE

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Field of the Invention

The present invention relates to methods and kits for applying adhesive coated decorative objects to substrates such as sheets of glass.

10 Description of the Related Art

U.S. Patent No. 5,665,446 describes a method for applying pressure-sensitive adhesive coated graphics to a substrate (e.g., a sheet of glass) using a laminate comprising a polymeric cover sheet and a layer of pressure-sensitive adhesive adhered to one surface of the cover sheet with the cover sheet and layer of pressure-sensitive adhesive being
15 vented. Generally that method includes the steps of adhering surfaces of the graphics opposite their layers of pressure-sensitive adhesive to the layer of pressure-sensitive adhesive on the laminate, using a solution to wet the graphics, the laminate and the substrate; placing the graphics adhered to the layer of pressure-sensitive adhesive on the laminate at a desired location on the substrate; pressing out air and water from between the
20 substrate and the graphics adhered to the layer of pressure-sensitive adhesive on the laminate; allowing the solution to dry; and removing the laminate to leave the graphics adhered to the substrate.

U.S. Patent 5,840,407 describes pieces of an optical film, each of which pieces have a layer of pressure-sensitive adhesive along one surface, and an opposite structured
25 surface (e.g., a grooved and/or vapor coated surface) so that the pieces visually simulate decorative glass such as glass with beveled edges, or with a groove along its length, or with a leaded appearance, or with a textured surface, or visually simulate glass related structures such as metal came. Such pieces of optical film have been applied to substrates (e.g., window panes) in predetermined patterns using automated application equipment in
30 industrial settings (e.g., by window manufacturers) for more than one year, however, heretofore it has been very difficult for persons such as homeowners to apply such optical

film on windows or other glass substrates with the precision needed so that it provides the desired visual simulation.

Summary of the Invention

5 The present invention provides a method for persons such as homeowners to accurately apply to a substrate (e.g., a sheet of glass in a window or mirror) decorative designs made using separate pieces of optical film of the type described in U.S. Patent 5,840,407, each of which pieces has a layer of adhesive along one surface, and an opposite structured surface (e.g., a surface that is grooved and/or vapor coated) so that the pieces
10 visually simulate decorative structures such as glass with beveled edges, or with a groove along its length, or with a leaded appearance, or with a textured surface, or glass related structures such as metal came.

 Generally, the method according to the present invention comprises the steps of (1) providing a kit including a laminate that is at least translucent comprising a cover sheet
15 with a layer of adhesive (e.g., pressure-sensitive adhesive) adhered to one surface; a predetermined printed design; and pieces of optical film that having peripheral shapes that correspond to parts of the printed design, each of which pieces of optical film have a layer of adhesive (e.g., pressure-sensitive adhesive) along one surface, and an opposite structured surface (e.g., a grooved and/or vapor coated surface) so that the pieces visually
20 simulate decorative structures; (2) placing the pieces of optical film over portions of the design corresponding to their shapes with the structured surfaces of the pieces of film along a common plane; (3) adhering the layer of adhesive on the laminate to the structured surfaces of the pieces of film; (4) placing the pieces of optical film adhered to the layer of adhesive on the laminate at a desired location on the substrate, (5) pressing the laminate
25 and thereby the pieces of optical film adhered to the laminate against the substrate, during which pressing step the laminate protects the structured surfaces of the pieces of film from damage; and (6) removing the laminate to leave the pieces of optical film adhered to the substrate in the predetermined design.

 Preferably the laminate is or has been made transmissive of moisture vapor (e.g., a
30 laminate that is vented as described in U.S. Patent No. 5,665,446), a solution is used to wet the pieces of optical film, the laminate and the substrate prior to the step of placing the pieces of optical film adhered to the layer of adhesive on the laminate at a desired location

on the substrate, which solution is allowed to dry between that step and the step of removing the laminate.

The printed design can be printed on the laminate or on a template that is positioned along the side of the laminate opposite its layer of adhesive. Step (2) (i.e., placing the pieces of optical film over portions of the design corresponding to their shapes) can then be accomplished by pressing the structured surfaces of the pieces of film against the layer of adhesive on the laminate while the laminate is supported on a planar surface. If the pieces of optical film have release liners over their layers of adhesive, those release liners should be removed before step (4) (i.e., placing the pieces of optical film adhered to the layer of adhesive on the laminate at a desired location on the substrate).

Alternatively, the predetermined printed design can be printed on a layer of at least translucent liner material (e.g., polyester) having a release surface shaped or treated to provide easy release from the layers of adhesive on the pieces of optical film, or the design can be printed on a template that is positioned along the side of the layer of liner material opposite its release surface. Step (2) (i.e., placing the pieces of optical film over portions of the design corresponding to their shapes) can then be accomplished by pressing the layers of adhesive on the pieces of optical film against the release surface on the liner material while the liner material is supported on a planar surface and after removing any release liners that were on those layers of adhesive. Step (3) (i.e., adhering the layer of adhesive on the laminate to the structured surfaces of the pieces of film) is then accomplished by pressing the layer of adhesive on the laminate against those structured surfaces on the pieces of film adhered to the liner material, after which the liner material is peeled away before step (4) (i.e., placing the pieces of optical film adhered to the layer of adhesive on the laminate at a desired location on the substrate).

Brief Description of the Drawing

The present invention will be further described with reference to the accompanying drawing wherein like reference numerals refer to like parts in the several views, and wherein:

Figure 1 schematically illustrates a kit provided as a first step in a first method according to the present invention for applying pieces of optical film to a substrate;

Figure 2 is an enlarged sectional view taken approximately along line 2-2 in Figure 1;

Figure 3 is an enlarged sectional view taken approximately along line 3-3 in Figure 1;

Figures 4 through 8 sequentially and schematically illustrate steps subsequent to the step illustrated in Figure 1 in the first method according to the present invention for applying pieces of optical film to a substrate;

Figure 9 illustrates a modification of the kit illustrated in Figure 1 that can be used in a method according to the present invention for applying pieces of optical film to a substrate that is similar to but slightly modified from the first method;

Figure 10 schematically illustrates a kit provided as a first step in a second method according to the present invention for applying pieces of optical film to a substrate;

Figure 11 schematically illustrates a step subsequent to the step illustrated in Figure 10 in the second method according to the present invention for applying pieces of optical film to a substrate;

Figure 12 is an enlarged fragmentary view schematically illustrating a step subsequent to the step illustrated in Figure 11 in the second method according to the present invention for applying pieces of optical film to a substrate;

Figure 13 illustrates a modification of the kit illustrated in Figure 11 that can be used in a method according to the present invention for applying pieces of optical film to a substrate that is similar to but slightly modified from the second method; and

Figure 14 is an enlarged fragmentary view schematically illustrating a step subsequent to the step illustrated in Figure 13 in the modified second method according to the present invention for applying pieces of optical film to a substrate.

Detailed Description of the Invention

Referring now to Figures 1 through 8 there is sequentially and schematically illustrated a first method according to the present invention for decorating a substrate 9 (e.g., a pane of glass 9 surrounded by a frame 8). Generally, that method comprises providing a kit (see Figures 1, 2 and 3) including a laminate 10 that is at least translucent. By saying that the laminate 10 or any other structure described herein is "at least translucent" we mean that the laminate or other structure is translucent or transparent

when dry or when wet, and specifically include laminates and other structures that are only translucent or transparent when wet. The laminate 10 comprises a polymeric cover sheet 11 and a layer 12 of pressure-sensitive adhesive adhered to one surface of the cover sheet 11. The laminate 10 allows transmission of moisture vapor between its major surfaces by means, including, but not limited to, being vented by passageways 13 through the cover sheet 11 and the layer 12 of adhesive between their major surfaces, (e.g., the laminate described in U.S. Patent No. 5,749,994 issued May 12, 1998, the content whereof is hereby incorporated herein by reference). The kit also includes a predetermined printed design 14, which design 14 can be printed on the laminate 10 as is illustrated in Figures 1 and 2; and the kit includes pieces 17 and 18 of optical film that have peripheral shapes corresponding to parts of the printed design 14, each of which pieces 17 and 18 of optical film has a layer 19 of pressure-sensitive adhesive along one surface and grooves, vapor coating and/or other structure along an opposite structured surface 20 so that the pieces 17 and 18 visually simulate decorative glass, such as glass with beveled edges, or with a central groove along its length, or with a leaded appearance, or with a textured surface, or visually simulate a glass related structure such as brass or lead came (e.g., the pieces of optical film described in U.S. Patent No. 5,840,407 issued November 24, 1998, the content whereof is hereby incorporated herein by reference). A release liner 22 (illustrated only in Figure 2) typically provided over the layer 12 of adhesive on the cover sheet 11 is removed, and the laminate 10 is supported with its layer 12 of adhesive uppermost on a horizontal surface 24 such as that of a tabletop (see Figure 4) to which it can be temporarily attached as with pieces of adhesive coated tape 25. The method then further includes (see Figure 4) placing the pieces 17 and 18 of optical film over portions of the design 14 corresponding to their shapes and adhering the structured surfaces 20 of the pieces 17 and 18 of film to the layer 12 of adhesive on the cover sheet 11 in that location. This places the structured surfaces 20 of the pieces 17 and 18 of film along a common plane. The substrate or glass sheet 9 to which the pieces 17 and 18 of film are to be attached should then be cleaned (e.g., with a liquid glass cleaner 27 from a squirt bottle 29) as illustrated in Figure 5, and any release liners 28 present over the layers 19 of adhesive on the pieces 17 and 18 of optical film (illustrated only in Figure 3) are removed. A solution 30 (e.g., 5% (by volume) rubbing alcohol in water or ½ % (by volume) soap in water from a squirt bottle 34) is then used to wet the pieces 17 and 18 of optical film, the

laminate 10 and the substrate 9 (see Figure 6). The pieces 17 and 18 of optical film adhered to the layer 12 of adhesive on the cover sheet 11 are placed at a desired location on the substrate 9 (see figure 7); air and water are pressed out from between the substrate 9 and the pieces 17 and 18 of optical film adhered to the layer 12 of adhesive on the cover sheet 11, during which pressing the laminate 10 protects the structured surfaces 20 of the pieces 17 and 18 of film from damage; and the solution 30 is allowed to dry. The laminate 10 is then peeled away to leave the pieces 17 and 18 of optical film adhered to the substrate 9 in the predetermined design (see Figure 8).

The kit including the laminate 10 on which the design 14 is printed together with the pieces 17 and 18 of optical film that have peripheral shapes corresponding to parts of the printed design 14 can be provided to a person such a homeowner who can decorate a surface such as the surface of a window or mirror using the method described above.

Figure 9 illustrates a modification of the kit illustrated in Figure 1 that is used in a method slightly modified from the method described above with reference to Figures 1 through 8. As is illustrated in Figure 9 (wherein structural parts that are essentially the same as those illustrated in Figure 1 are identified by the same reference numerals to which have been added the suffix "a"), the predetermined printed design 14a can be printed on a template 26 made of paper or thin polymeric material rather than being printed on the laminate 10 as illustrated in Figures 1 and 2. The first method described above is then modified in that the template 26 is positioned behind the at least translucent laminate 10a on its side opposite the layer 12a of adhesive after which the pieces 17a and 18a of optical film are positioned over portions of the design 14a corresponding to their shapes and their structured surfaces 20a are adhered to the layer 12a of pressure-adhesive on the cover sheet 11a. The rest of the method for decorating a substrate remains the same as that described above with reference to Figures 5 through 8. A kit for use by a person in decorating a surface (e.g., for use by a homeowner in decorating a window or mirror) can thus include the laminate 10a, one or more of the templates 26 on which the design 14a or a variety of designs are printed, together with the pieces 17a and 18a of optical film that have peripheral shapes corresponding to parts of the printed design 14a or designs. Such a kit could provide a selection of designs, any of which could utilize the same laminate 10a to apply it.

Referring now to Figures 10, 11, and 12, there is sequentially and schematically illustrated parts of a second method according to the present invention for decorating a substrate. The second method uses essentially the same structures used in the first method described above with reference to Figures 1 through 8, (which structures have been given the same reference numerals to which have been added the suffix "b") together with a layer 31 of polymeric liner material that is at least translucent. Generally, like the first method, the second method comprises providing a kit (see Figure 10) including a laminate 10b that is at least translucent and comprises a polymeric cover sheet 11b and a layer 12b of pressure-sensitive adhesive adhered to one surface of the cover sheet 11b, which laminate 10b allows transmission of moisture vapor between its major surfaces by means such as being vented by passageways 13b between their major surfaces, (e.g., the laminate described in U.S. Patent No. 5,749,994); including a predetermined printed design 14b, and including pieces 17b and 18b of optical film that have peripheral shapes corresponding to parts of the printed design 14b, each of which pieces 17b and 18b of optical film has a layer 19b of pressure-sensitive adhesive along one surface and grooves, vapor coating, or other structure along an opposite structured surface 20b so that the pieces 17b and 18b visually simulate decorative glass or glass related structures (e.g., the pieces of optical film described in U.S. Patent No. 5,840,407). The second method differs from the first method described above in that, instead of the predetermined printed design 14b being printed on the laminate 10b, it is instead printed on the layer 31 of polymeric liner material (e.g., 0.001 to 0.004 inch or 0.0025 to 0.010 centimeter thick polyester). The layer 31 of liner material has a release surface shaped or treated to provide easy release from the layers 19b of adhesive on the pieces 17b and 18b of optical film. The layer 31 of liner material is supported with its release surface uppermost on a horizontal surface 32 such as that of a tabletop (see Figure 11) to which it can be temporarily attached as with pieces of adhesive coated tape 33. The pieces of optical film 17b and 18b are placed over portions of the design 14b corresponding to their shapes on the layer 31 of liner material (see Figure 11) and the layers 19b of adhesive on the pieces 17b and 18b of optical film are pressed against the release surface on the layer 31 of liner material after removing any release liners that were on those layers 19b of adhesive. This places the structured surfaces 20b of the pieces 17b and 18b of film along a common plane. The release liner typically provided over the layer 12b of adhesive coating on the cover sheet 11b is

removed and the layer 12b of adhesive on the cover sheet 11b is then pressed against and adhered to the structured surfaces 20b on the pieces 17b and 18b of film adhered to the liner material 31 (see Figure 12), after which the liner material 31 is peeled away. The cover sheet 11b with the pieces 17b and 18b of film adhered to it by the layer of adhesive 12b is then used to apply the pieces 17b and 18b to the substrate in the manner described above with reference to Figures 5 through 8 of the drawing.

Figure 13 illustrates a modification of the kit illustrated in Figure 10 that is used in a method slightly modified from the second method described above with reference to Figures 10 and 11. As is illustrated in Figure 13 (wherein structural parts that are essentially the same as those illustrated in Figure 10 are identified by the same reference numerals to which have been added the suffix "c"), the predetermined printed design 14c, instead of being printed on the layer 31 of liner material as illustrated in Figure 10, can be printed on a template 36 of paper or thin polymeric material that is positioned behind the layer 31c of liner material on its side opposite its release surface as the pieces 17c and 18c of optical film are placed over portions of the design 14c corresponding to their shapes and the layers 19c of adhesive on the pieces 17c and 18c of optical film are pressed against the release surface on the layer 31c of liner material after supporting the layer 31c of liner material on a planar surface and removing any release liners that were on those layers 19c of adhesive. This places the structured surfaces 20c of the pieces 17c and 18c of film along a common plane. The release liner typically provided over the layer 12c of adhesive coating on the cover sheet 11c is removed and the layer 12c of adhesive on the cover sheet 11c is then pressed against and adhered to the structured surfaces 20c on the pieces 17c and 18c of film adhered to the liner material 31 (see Figure 14), after which the liner material 31c is peeled away. The cover sheet 11c with the pieces 17c and 18c of film adhered to it by the layer of adhesive 12c is then used to apply the pieces 17c and 18c to the substrate in the manner described above with reference to Figures 5 through 8 of the drawing. A kit for use by a person in decorating a surface (e.g., for use by a homeowner in decorating a window or mirror) can thus include the laminate 10c, one or more of the templates 36 on which the design 14c or a variety of designs are printed, together with the pieces 17c and 18c of optical film that have peripheral shapes corresponding to parts of the printed design 14c or designs. Such a kit could provide a selection of designs, any of which could utilize the same laminate 10c to apply the pieces 17c and 18c in a pattern

corresponding to the designs as described above. Alternatively, the template 36 need not be used, and a person could arrange the pieces 17c and 18c on the laminate 31c in a desired decorative pattern designed or selected by the user without the use of the design 14c. The layers 19c of adhesive on the pieces 17c and 18c of optical film would be pressed against the release surface on the layer 31c of liner material after the desired arrangement of the pieces 17c and 18c was determined and any release liners that were on the layers 19c of adhesive on those pieces 17c and 18c were removed. The rest of this further modified second method for decorating a substrate would then remain the same as that described above with reference to Figures 10, 11 and 12 or to Figures 13 and 14.

The present invention has now been described with reference to several embodiments and modifications thereof. It will be apparent to those skilled in the art that many changes can be made in the embodiments described without departing from the scope of the present invention. For example, it may be useful for some applications to provide one or both of the pieces 17, 17a, 17b, 17c, or 18, 18a, 18b, 18c in a shape that requires the person applying the kit to use a cutting device such as a razor blade to sever the pieces to a desired shape or length depending on the particular pattern that is used, or the size of the substrate to which the kit is applied. Thus, some of the pieces could have lengths that required them to be shortened before or after the kit is applied, or could have ends that are cut to one shape if one pattern was to be used or to another shape if another pattern was used. The adhesive on the pieces and/or on the cover sheet 11, 11a, 11b, 11c could be other than a pressure sensitive adhesive such as an adhesive that is activated by the application of a liquid, or the application of heat. The cover sheet and adhesive in the laminate 10, 10a, 10b, 10c could be of materials that allow moisture vapor transmission without vent holes of the type illustrated. Thus, the scope of the present invention should not be limited to the methods and structures described in this application, but only by the methods and structures described by the language of the claims and the equivalents thereof.